We, being the persons(s) identified below as the Applicant, request the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying standard complete specification. Full application details follow.

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(54) Invention Title - "METHOD OF PREVENTING FRAUD IN INBAND SIGNALLING TELEPHONE SYSTEM"

(72) Name(s) of actual inventor(s):  Marcel DEVOS

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BASIC CONVENTION APPLICATION(S) DETAILS

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<th>(31) Application Number</th>
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<td>95200761.5</td>
<td>THE NETHERLANDS</td>
<td>NL</td>
<td>27th March 1995</td>
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DIVISIONAL APPLICATION DETAILS

PARENT INVENTION DETAILS (Patent of Addition requests only)

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Drawing number recommended to accompany the abstract ....

ALCATEL N.V.

B. O'Connor  
(Authorized Signatory)

Date  4 March 1996
NOTICE OF ENTITLEMENT

We, ALCATEL N.V.

of Burgemeester Elsenlaan 170, 2288 BH Rijswijk, The Netherlands.

being the applicant in respect of Application No. for an invention entitled "METHOD PREVENTING FRAUD IN INBAND SIGNALLING TELEPHONE SYSTEM" described in the accompanying specification, state the following:

1. The company nominated for the grant of the patent has entitlement from the actual inventor by mesne assignment.

2. The company nominated for the grant of the patent has entitlement from the applicant of the basic application listed on the patent request form by assignment.

3. The basic application listed on the request form is the first application made in a Convention country in respect of the invention.

ALCATEL N.V.

B. O'Connor

4 March 1996
The disclosed method prevents fraud in an inband signalling telephony system, such as a No. 5 signalling system. It includes a first step of detecting a fraudulent inband signal at a predetermined location of an outgoing signal path between an input terminal Os and an output terminal Oss of a trunk module T included in the inband signalling telephony system. The predetermined location is situated between the input terminal Os and an injection terminal I of the outgoing signal path where an inband signal can be injected. In a second step, the fraudulent inband signal is removed from the outgoing signal path by interrupting this path during a time interval at least equal to the duration of the inband signal.

The trunk module realizing this method includes a receiver similar to the receivers used in the inband signalling path of the trunk module to detect incoming inband signals and to filter these out before transmitting the signal to a user station connected to the trunk module. This receiver is coupled between the above mentioned input terminal Os and the injection terminal I.
Claim

1. A method for preventing fraud in an inband signalling telephony system, wherein said method includes the steps of:
   - detecting fraudulent inband signal at a predetermined location of an outgoing signal path between an input terminal and an output terminal of a trunk module included in said inband signalling telephony system, said predetermined location being situated between said input terminal and an injection terminal of said outgoing signal path where an inband signal can be injected; and
   - removing a said fraudulent inband signal from, said outgoing signal path when detected.

4. A trunk module included in an inband signalling telephony system, said trunk module including an input terminal and an output terminal between which an outgoing signal path can be established, and an inband signal generation means coupled to an injection terminal of said outgoing signal path and adapted to generate inband signals, wherein said trunk module additionally includes an inband signal detection means coupled to said outgoing signal path between said input terminal and said injection terminal and adapted to detect inband signals and a removal means coupled between said input terminal and said injection terminal and adapted to remove a said inband signal from said outgoing signal path under control of an output signal of said inband detection means, when detected.
Invention Title:

"METHOD FOR PREVENTING FRAUD IN AN INBAND SIGNALLING TELEPHONE SYSTEM"

The following statement is a full description of this invention, including the best method of performing it known to us:-
This invention relates to a method for preventing fraud in an inband signalling telephony system.

The problem of fraud with respect to inband signalling telephony systems, e.g. No.5 signalling systems, is well known and especially applies to international systems and to "free-phone", i.e. international toll-free phone. So called "hackers" can via a normal phone inject inband signals in an outbound signalling path of a telephony system in such a way that they get access to this telephony system. A detailed description of the frauds problem in No.5 signalling systems can be found in the paper distributed at the International Network Abuse Prevention meeting held in Brussels on 6-7 May 1992 "CCITT No. 5 Bluebox Fraud" by A.S. Foote of AT&T. The problem is also acknowledged in the CCITT Temporary Document XI/1-16 of Working Party XI/1, Geneva 10 - 12 March 1992, Question 7/XI p. 3, item 10.

In the CCITT Recommendations Q. 141 Fascicle VI.2, chapter II, p. 58, item h) measures are proposed to detect such fraud attempt and to possibly react thereon. However, these measures rely on actions to be taken by both sides of a communication. As such a communication can be an international one this implies an agreement to be followed by different national operators or administrations which is often difficult to realize.

Therefore, an object of the present invention is to provide a method for preventing fraud in the above type of telephony networks, but which does not rely on the goodwill of operators or administrations.

According to the invention there is provided a method for preventing fraud in an inband signalling telephoning systems wherein the method includes the steps of:

- detecting a fraudulent inband signal at a predetermined location of an outgoing signal path between an input terminal and an output terminal of a trunk module included in said inband signalling telephony system, said predetermined location being situated between said input terminal and an injection terminal of said outgoing signal path where an inband signal can be injected; and

- removing a said fraudulent inband signal from said outgoing signal path
When in the first mentioned step an inband signal is detected, this means that someone has in a fraudulent way injected this signal, since normally, this signal should only appear after the injection terminal. This signal is then removed from the outgoing signal path.

An additional feature of the present invention is that said step of removing said fraudulent inband signal is realized by interrupting said outgoing signal path between said input terminal and said injection terminal, for a predetermined time interval. This time interval has to be such that the fraudulent inband signal is intercepted without losing speech signals, i.e. it has at least to be equal to the duration of the fraudulent signal, but it may not overlap the time interval used for the transmission of speech signals.

Another object of the present invention is to provide a trunk module realizing the above method.

This is achieved by means of a trunk module including an input terminal and an output terminal between which an outgoing signal path can be established, and an inband signal generation means having an output coupled to an injection terminal of said outgoing signal path and adapted to generate inband signals, said trunk module additionally including an inband signal detection means coupled to said outgoing signal path between said input terminal and said injection terminal and adapted to detect inband signals and a removal means coupled between said input terminal and said injection terminal and adapted to remove a said inband signal from said outgoing signal path under control of an output signal of said inband detection means, when detected.

Preferably, the removal means includes interruption means to interrupt said outgoing signal path during a predetermined time interval. As mentioned earlier this predetermined time interval has to be such that the inband signal intercepted without losing speech signals.

Preferably, the trunk module additionally includes a second inband signal detection means and a second removal means similar to the first mentioned signal detection means and the first mentioned removal means to detect and remove inband
signals on and from an incoming signal path of said trunk module respectively.

It is well known that trunk modules of inband signalling telephony systems include inband signal detection circuitry and removal circuitry to detect and extract inband signals on and from incoming signalling paths. This circuitry is included in well known receivers of the trunk module. Similar circuitry can be used to detect the fraudulent inband signals in the outgoing signal path and remove it from that path. As a result, no additional development effort is required to realize the first mentioned detection circuitry and removal circuitry thereby realizing a very efficient design of the subject trunk module.

The above mentioned and other objects and features of the invention will become more apparent and the invention itself will be best understood by referring to the following description of an embodiment taken in conjunction with the accompanying drawing which schematically represents a trunk module T according to the invention.

The trunk module T is a No.5 signalling trunk module included in a No. 5 signalling telephony system (not shown). It includes a receiver module REC1 coupled between an input terminal Iss and an output terminal Is. An input terminal Os is connected to an input of another receiver module REC2, similar to REC1, and an output of REC2 is connected to an input of a sender module SEN, an output of which is coupled to an output terminal Oss or T.

The trunk module T is able to receive at its input terminal Iss a like named input signal consisting of a speech signal and an inband signal. The inband signal is in the receiver module REC1 filtered out and only the speech signal is provided at the output terminal IS to be transmitted to a subscriber station (not shown).

A signal Os applied at the terminal Os by a subscriber station is applied to REC2 in order to detect and filter out possible inband signals. A resultant signal is applied to SEN which adds a No.5 signal thereby obtaining the outgoing signal Oss. The location at which the No.5 signal is added is in the figure represented by an injection terminal I located in the circuitry of SEN.

Normally the signal Os should only contain speech signals since the No.5 signalling is added to the signal provided by the subscriber station by SEN. Detection
in REC2 of an inband signal thus means that someone is trying to get access to the
system in a fraudulent way. This signal is then filtered out by REC2.

SEN and, REC1 and REC2, are a sender and receivers realized according to
the CCITT Recommendations Q143 and Q144 respectively. Their realization
according to the latter standard being obvious for a person skilled in the art, they are
not described in further details.

While the principles of the invention have been described above in connection
with specific apparatus, it is to be clearly understood that this description is made only
by way of example and not as a limitation on the scope of the invention.
The claims defining the invention are as follows:

1. A method for preventing fraud in an inband signalling telephony system, wherein said method includes the steps of:
   - detecting fraudulent inband signal at a predetermined location of an outgoing signal path between an input terminal and an output terminal of a trunk module included in said inband signalling telephony system, said predetermined location being situated between said input terminal and an injection terminal of said outgoing signal path where an inband signal can be injected; and
   - removing a said fraudulent inband signal from, said outgoing signal path when detected.

2. A method as claimed in claim 1, wherein said step of removing said fraudulent inband signal is realized by interrupting said outgoing signal path between said input terminal and said injection terminal for a predetermined time interval.

3. A method as claimed in claim 2, wherein said predetermined time interval is at least equal to the time duration of said fraudulent inband signal.

4. A trunk module included in an inband signalling telephony system, said trunk module including an input terminal and an output terminal between which an outgoing signal path can be established, and an inband signal generation means coupled to an injection terminal of said outgoing signal path and adapted to generate inband signals, wherein said trunk module additionally includes an inband signal detection means coupled to said outgoing signal path between said input terminal and said injection terminal and adapted to detect inband signals and a removal means coupled between said input terminal and said injection terminal and adapted to remove a said inband signal from said outgoing signal path under control of an output signal of said inband detection means, when detected.

5. A trunk module as claimed in claim 4, wherein said removal means includes interruption means to interrupt said outgoing signal path during a predetermined time interval.

6. A trunk module as claimed in claim 4, wherein said trunk module additionally includes a second inband signal detection means and a second removal means similar to the first mentioned signal detection means and the first mentioned removal
means to detect and remove inband signals on and from an incoming signal path of said trunk module respectively.

7. A trunk module as claimed in claim 5, wherein said predetermined time interval is at least equal to the duration of said detected inband signal.

8. A method substantially as herein described with reference to the figure of the drawing.

9. A trunk module substantially as herein described with reference to the figure of the drawing.

DATED THIS EIGHTEENTH DAY OF JANUARY 1996

ALCATEL N.V
The disclosed method prevents fraud in an inband signalling telephony system, such as a No. 5 signalling system. It includes a first step of detecting a fraudulent inband signal at a predetermined location of an outgoing signal path between an input terminal Os and an output terminal Oss of a trunk module T included in the inband signalling telephony system. The predetermined location is situated between the input terminal Os and an injection terminal I of the outgoing signal path where an inband signal can be injected. In a second step, the fraudulent inband signal is removed from the outgoing signal path by interrupting this path during a time interval at least equal to the duration of the inband signal.

The trunk module realizing this method includes a receiver similar to the receivers used in the inband signalling path of the trunk module to detect incoming inband signals and to filter these out before transmitting the signal to a user station connected to the trunk module. This receiver is coupled between the above mentioned input terminal Os and the injection terminal I.